# Compressive Wireless Arrays for Bearing Estimation

**A sensing technology that allows for the detection of objects with a small number of sample signals**

Georgia Tech inventors have developed a compressive sensing (CS) system, which uses a relatively small number of non-traditional samples in the form of randomized projections to reconstruct sparse signals. Direction-of-arrival (DOA) estimation is performed with an array of sensors using CS. Using random projections of sensor data, along with comprehensive reference sensor data, a sparse signal space scenario can be reconstructed, giving the number of signal sources and their DOA's. When the target bearings, direction of travel, are modeled as a sparse vector in the angle space, functions of microphone signals can be used to determine multiple source bearings. This technology allows for the detection of objects and the ability to distinguish between those objects, such as being able to detect vehicles and distinguish between a car and an SUV.

**Summary Bullets**

- **Efficient** – Uses minimum possible samples to reconstruct space
- **Passive** – System listens to available signals, it does not send our signals that could cause interference
- **Low Power** – System uses low power consumption because it listens to available signals

Solution Advantages

- **Efficient** – Uses minimum possible samples to reconstruct space
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Potential Commercial Applications

- Military
- Telecommunications
- Animals/Environment
- Safety/Construction

Background and More Information

Joint processing of sensor array outputs improves the performance of parameter estimation beyond the sum of the individual sensor processing results. To achieve this gain in performance, arrays are often tethered together since the output of data from each sensor in the array generally requires a high bandwidth for transmission. Once transmission is initiated in a wireless setting, the sensor batteries can be quickly depleted and array elements may cause communication interference as they send large data packages. Compared to wireless proximity sensors, arrays are harder to set up and deploy. There is a clear need for a wireless design for arrays to overcome the disadvantages of the tethered array designs.

**Inventors**


- Dr. James McClellan
  Professor; John and Marilu McCarty Chair of Electrical Engineering - Georgia Tech School of Electrical and Computer Engineering
- Dr. Rama Chellappa
  Minta Martin Professor of Engineering, Distinguished University Professor - University of Maryland Department of Electrical and Computer Engineering
- Ali Gurbuz
  Former Graduate Student - Georgia Tech School of Electrical and Computer Engineering
- Volkan Cevher
  Research Scientist - University of Maryland Department of Electrical Engineering


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**Publications**

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**Images**

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